

What is claimed is:

- 1 1. An electronic structure comprising
2 a substrate having a dielectric layer having a via opening therein; having sidewalls
3 and bottom surfaces;
4 a barrier layer deposited on the sidewalls and bottom surfaces of the via opening;
5 and copper electrodeposited from a bath having a pH of about 12.89 or greater on the barrier
6 layer on the sidewalls and bottom surfaces of the via opening..
- 1 2. The structure of claim 1 wherein the thickness of the copper is about 10 nanometers
2 to about 100 nanometers.
- 1 3. The structure of claim 1 wherein the thickness of the copper is about 20 to about 50
2 nanometers.
- 1 4. The structure of claim 1 wherein the barrier layer is selected from the group
2 consisting of tungsten, titanium, tantalum, nitrides thereof, silicon nitrides thereof and alloys
3 thereof.
- 1 5. The structure of claim 1 wherein the barrier layer having thickness of at least about 4
2 nanometers.
- 1 6. The structure of claim 1 wherein the dielectric layer comprises silicon dioxide.
- 1 7. The structure of claim 1 wherein the via opening has an aspect ratio of greater than
2 3:1.
- 1 8. The structure of claim 1 wherein the barrier layer comprises tungsten.
- 1 9. The structure of claim 1 wherein a free of a seed layer between the barrier layer and
2 copper.

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1 10. A method of fabricating an electronic structure which comprises forming an
2 insulating material on a substrate; lithographically defining and forming recesses for lines
3 and/or via having sidewalls and bottom surface in the insulating material in which
4 interconnection conductor material will be deposited;
5 depositing a barrier layer on sidewalls and bottom surfaces of the recesses;
6 depositing copper on the barrier layer by electroplating from a bath having a pH of
7 about 12.89 or greater, a source of cupric ions and a complexing agent and at a current
8 density of about 5 to about 25 $\mu\text{A}/\text{cm}^2$.

1 11. The method of claim 10 wherein the copper is deposited to provide a thickness of
2 about 10 nanometers to about 100 nanometers.

1 12. The method of claim 10 wherein the copper is deposited to provide a thickness of
2 about 20 to about 50 nanometers.

1 13. The method of claim 10 wherein the barrier layer is selected from the group
2 consisting of tungsten, alloys of tungsten, titanium, alloys of titanium, titanium nitride,
3 tantalum, tantalum nitride and tantalum silicon nitride.

1 14. The method of claim 10 wherein the barrier layer has a thickness of at least about 4
2 nanometers.

1 15. The method of claim 10 wherein the barrier layer is tungsten.

1 16. The method of claim 10 wherein the dielectric is silicon dioxide.

1 17. The method of claim 10 wherein the recess has an aspect ratio of greater than 3:1.

1 18. The method of claim 10 wherein the electroplating bath is at a room temperature of
2 about 22° C.

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1 19. The method of claim 10 wherein the source of cupric ions is CuSO_4 , and the
2 complexing agent is EDTA or salt of thereof..

1 20. The method of claim 19 wherein the electroplating bath comprises sodium
2 hydroxide or potassium hydroxide.

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1 21. The method of claim 10 wherein the electroplating bath further comprises a
2 stabilizer and surfactant.

1 22. The method of claim 21 wherein the stabilizer is 2,2' -bipyridyl.

1 23. The method of claim 10 wherein the plating bath further comprises cyanide ions.

1 ~~24. An aqueous copper plating bath comprising a source of cupric ions and a~~
2 ~~complexing agent, having pH at least 12.89 and a deposition rate of at least $15 \mu\text{A}/\text{cm}^2$.~~

1 25. The plating bath of claim 24, wherein the source of cupric ions is CuSO_4 and the
2 complexing agent is EDTA or salt of thereof.

1 26. The plating bath of claim 24 which further comprises sodium hydroxide.

1 27. The method of claim 25 wherein the electroplating bath further comprises a
2 stabilizer and surfactant.

1 28. The structure obtained by the method of claim 10.

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